Designing a Better Model Governance System

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pwc

Overview

Model risk management (MRM) continues its rapid growth in the insurance sector

- Much of the US activity grew out of the Financial Crisis and the SIFI designation of some large, notable insurers

- Growth has come from non SIFI and non-Fed supervised insurers that are striking the right commercial balance in their evolving MRM activities

- Not just a compliance function but becoming an integral part of the business

- Model Risk Management can be expensive

- As more insurers are adopting MRM programs, they are looking to increase the efficiency and effectiveness of existing programs

Overview

Developing and utilizing an effective MRM system will promote better MRM performance

- A basic MRM system should provide a platform for managing MRM activities, in particular tracking and managing validations

- Scheduling model validations

- Project managing the model validation plan

- Notifying model owners

- Keeping track of remediation items discovered in the model validation process

- Storing documents used in the validation

Overview

As insurers accumulate information about their models through scoring and validation processes, there is a need to enhance their systems:

- To gain beneficial insight across their model inventory

- Especially commonality of observations and the interactions between models

Based on recent client work and recent industry surveys, I will share some thoughts on the key characteristics of an:

- An effective base platform

- Cross-inventory opportunities

- How risk managers can design or enhance MRM processes and systems to take advantage of these opportunities

Basic characteristics of an MRM system

- An essential starting point for insurers initiating an MRM program is to develop an inventory of their models

- Since MRM programs typically encompass all of an insurer's models - not just actuarial or risk or financial ones - the inventory can be quite large

- A PwC survey conducted early last year indicated that more than half of insurance respondents had over 150 models in their inventory

- A quarter of those surveyed had **over 450**

- Another survey we conducted later in the year found that MRM systems' primary task at all insurers is to catalogue all of their models

Basic characteristics of an MRM system

Once catalogued, an obvious next step is to populate the system with information that helps manage the MRM process.

Typically, we see the following functionality in effective systems:

1. Model documentation repository

2. Model validation document repository

3. Model risk scoring repository

4. Tracking findings needing attention and due dates for that attention

5. Emailing notification to model owners and others of upcoming or missed tasks

6. Reporting

1 -*Model Owner Document Repository*

- Model documentation is the starting point when conducting a validation.

- Providing access to that documentation is important for validation and ongoing risk management of the model

- Sometimes comprehensive documentation is not available and needs to be developed
    - Typically for models undergoing their first validation
    - Can also occur for vendor models

- The validation exercise often points out the need for model owner documentation to improve

- Having a central place where model documents are stored can be very useful but if the system isn't designed properly, they could be slow to access for the system user

At this point, a spreadsheet list will no longer be adequate because embedding documents into a spreadsheet will not be efficient or effective

2 - Validation Document Repository

- 90% of respondents in a recent PwC survey of insurers that had a multifunction system (i.e., systems that do more than just catalogue models) reported that their system was a repository for validation and/or model documentation.

- Also of importance, as programs mature, the system needs an appropriate mechanism to update the repository with documentation from subsequent validations

  - Presumably without losing earlier versions

This would be a good place to pause as this highlights a problem…………

What happens when a model is validated more than once?

Model Inventory List

We have an inventory and with it, we identify models by Model Number

Model Number	Model Name	Model Owner
101	VA Reserve Model	Roger S.
102	Term Reserve Model	Danny W.
103	Universal Life Reserve Model	Troy A.

How do we identify Validations?

Model Validation List

By a Validation Number

Model Number	Validation Number	Validation Date	Validation Status
102	102A	7/12/2018	Fail
102	102B	3/2/2019	Pass

Model Validation List

Validation # 102A

Validation # 102B

Same Model Number and descriptive information

Different Validation Number

Our Inventory is now taking on more things that would call for a system

3 - Model Risk Scoring

- Storing model risk scores and the details about the model that were used to develop its score is a feature present at about two-thirds of surveyed respondent companies

- Model risk scores are often used to prioritize and sequence validations, so the first score is likely developed before the model is validated

- Validations often shed new light on a model and can often lead to a change in score

- Some insurers have begun to revisit their earlier scores and scoring algorithms, often placing greater emphasis on models that permanently impact cash flow

- Your MRM system should be capable of tracking the development of the model's risk score as it changes over time

We are now asking the system to store values at the Model Level as the metadata changes over time

4 - Tracking Findings

- Managing hundreds of models is likely to lead to an extensive list of findings needing attention
  - You could have <u>hundreds of findings per year</u> to keep track of!!!!

- Keeping track of these, the party responsible for addressing them and their expected completion dates seems a natural choice for an MRM system feature

- It is also worth noting that, as models are being built or undergoing significant modifications, the system can be used to keep track of their progress and validation needs

What would this look like?

Model Validation Findings

Model Number	Validation Number	Finding Number	Finding	Assigned To	Due Date
101	101A	101A-01	Questionable mortality assumption	Roger S.	3/15/2018
101	101A	101A-02	Questionable lapse assumption	Roger S	5/20/2018
101	101A	101A-03	Questionable benefit utilization assumption	Roger S.	8/20/2018

5 - *Email notification*

- It seems a short step from tracking to emailing notifications and follow-ups, as required

- Our survey showed that only slightly more than half of the multifunction systems have this functionality

- Connectivity between the MRM system and the model owner can be used to notify the model owner of upcoming responsibilities and memorialize responses.

6 – Reporting Dashboard

- As with any process, reporting on MRM activity, particularly the progress of validations and issue resolution is a necessary antecedent to managing the process

- About three quarters of the respondents have this functionality built into their system

- Though only a few have developed this as a real time reporting dashboard

- Many are working on this or planning to do so
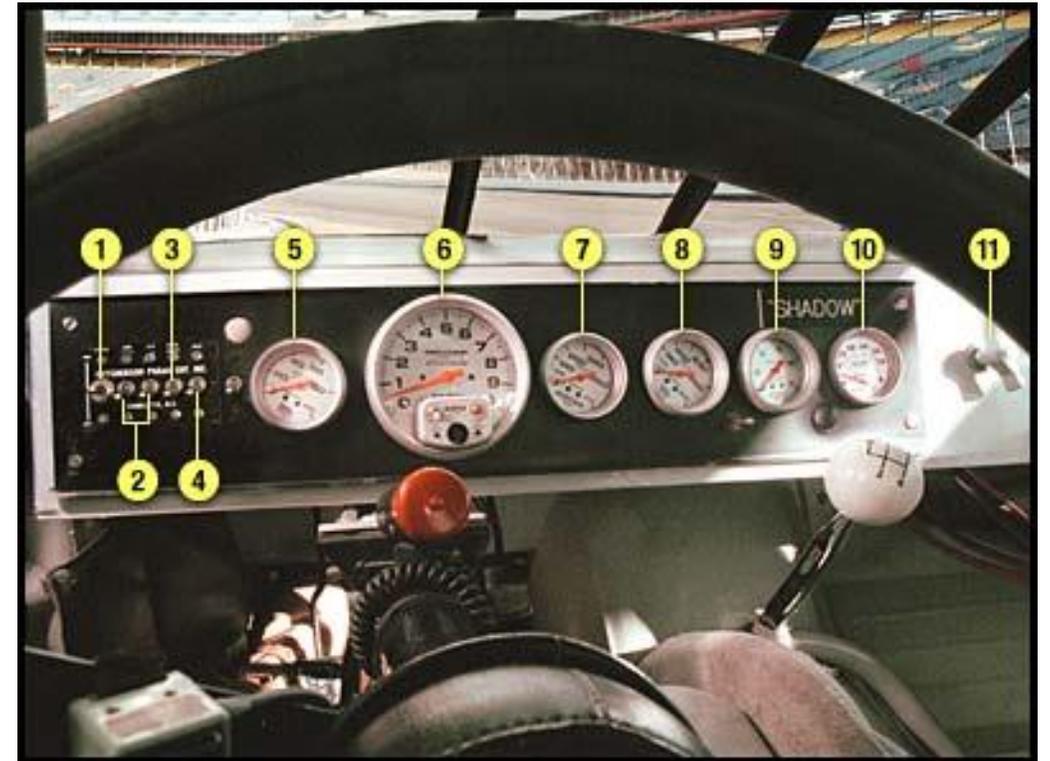
Cross-inventory commonalities and connections

To date, most insurance model validation occurs in a silo containing just the one model under consideration

- Recognizing that MRM is still a relatively new program at many insurers, early emphasis has been on developing a system that supports initial validation efforts

- However, as programs mature and systems' basic functionality has been established, insurers should consider enhancements that could increase the overall value of their MRM program.

- These enhancement opportunities come from better utilizing the information in the system

- In particular, they come from working across the inventory rather than one model at a time

Cross-inventory commonalities and connections

- Different models are likely to have many assumptions in common

- The system could compare assumptions across models in the inventory

- If two models use different values for the same assumption it would be instructive to investigate the sources and implications of these differences

- Potentially, differences are not appropriate and, if not corrected, could cause increased risk across the model inventory

- A single source model for this assumption could apply to all cases, thus reducing overall modelling costs.

- Different models frequently utilize common component parts
  - For example, both stress testing and ALM models may use common cash flow projection engines
  - Although both models should undergo their own validations, some elements of the work can be reused

Cross-inventory commonalities and connections

- With proper safeguards, multiple replication of the same calculation algorithms would be unnecessary

- Often the replication element of a validation is one of the most resource intensive and costly aspects of the work, so avoiding duplication here could meaningfully improve efficiency

- Few if any models exist completely on their own, isolated from others in the inventory

- Typically, models are fed some input from upstream models and often send some output downstream to other models

- This web of connectivity can be hard to visualize but the raw material for doing so could be available from the MRM system

- Typically, systems will need some enhancement to allow insurers to mine this material

Enhancing the system to enable cross-inventory gains

The next significant step in MRM's development can come from a holistic look at the whole model inventory.

Some process and system enhancements that can enable cross-inventory perspective include:

1. **Model documentations standards**

2. **Terminology standards**

3. **Upstream and downstream precision**

Model documentations standards

- Most insurers have developed a playbook or template that they expect validators to follow in conducting validations and completing validation documentation.

- It is not often though that we find the same attention to standards in documenting models.

- Standardization can benefit both the model documenters and MRM cross-inventory analysis.

Terminology standards.

- Because many different model owners and users have developed models independent of each other over several years, it's not surprising to encounter inconsistent terminology.

- Different terms often describe the same thing and sometimes the same term describes something else.

- As the MRM system becomes more densely populated, a thorough review can identify inconsistencies and enable greater standardization.

Upstream and downstream precision

- Many validation report guidelines (and presumably good model documentation guidelines) require identification in input and output of upstream and downstream models, respectively.

- It would seem a modest step to require that these identified models are cross-referenced to their place in the inventory, presumably using the same model number identification tag.

Next Steps

- Insurers should bring their MRM systems up to base line capabilities by enabling the functionalities we describe above.

- As validations and model risk management activities populate the MRM system, insurers should use that information to standardize model documentation formats and develop consistent terminology.

- Model and validation documentation should reference upstream and downstream models using the system's identifiers.

- Insurers can then mine the information contained in their MRM system to:

  - Ensure consistency where required,

  - Eliminate duplicative validation tasks and,

  - Map their model web, eliminating unused models, improving models that need updating, and carefully nurturing and managing the models that are of greatest value to the organization's success.

What do I want my Model Risk Management System to do?
A Wish List

- Inventory the models

- Risk score/rate the models

- Maintain the Meta data
  - Model Name
  - Model Number
  - Model Validation Status
  - Model Owner
  - Model Developer
  - Etc.

- Store documents
  - Model documentation
  - Validation reports

- Feed data into a MRM Dashboard
  - Model Validation Status
  - Model Validation Workflow Progress

- Email notifications

- House the Model Validation schedule/project plan

- Keep track of remediation items and follow up

- Record model connectivity and flow charts

A Final thought before Questions

In order to have the necessary culture around Model Risk Management, one must have senior leadership buy in.

But to facilitate this culture and the resulting activities, one will need a MRM system capable of supporting the needs of all stakeholders.

Questions?